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CLAIMS

1. Method for calibrating a measuring system comprising a measuring device (1) with a laser tracker (2) and an opto-electronic sensor (3) having fixed positions relative to one another, an auxiliary measuring tool (4) and a system computer, wherein the auxiliary measuring tool (4) comprises at least one reflector (5) for reflecting a measuring beam (7) directed on to it by the laser tracker (2) and at least three light spots (6) to be registered by the opto-electronic sensor (3) and being arranged in a known light spot arrangement, the method comprising the steps of:

rigidly coupling the auxiliary measuring tool (4), if it comprises fewer than three reflectors (5), with an arrangement of auxiliary reflectors (5‘),

moving the auxiliary measuring tool (4), if applicable together with the arrangement of auxiliary reflectors (5‘) around at least two rotation axes being different relative to the auxiliary measuring tool (4),

registering in at least two rotation positions for each one of the at least two rotation axes, measured data regarding the at least three reflectors (5) and, if applicable, auxiliary reflectors (5‘) with the laser tracker (2) and measured data regarding the at least three light spots (6) with the opto-electronic sensor (3),

calculating from the measured data of the laser tracker (2) positions and orientations of the reflector arrangement relative to the laser tracker (2) and from the measured data of the opto-electronic sensor (3) positions and orientations of the light spot arrangement relative to the opto-electronic sensor (3),

calculating from the positions and orientations of the two arrangements the at least two rotation axes (1A, 2A) relative to the reflector arrangement and the at least two rotation axes (1B, 2B) relative to the light spot arrangement, and

calculating calibration data by equating corresponding rotation axes (1A with 1B, 2A with 2B) of the two arrangements and storing the calibration data in the system computer.

2. Method according to claim 1, wherein the at least two rotation axes being different relative to the auxiliary measuring tool (4) are created by mounting the auxiliary measuring tool (4), if applicable together with the arrangement of auxiliary reflectors (5') in at least two different orientations relative to a stationary rotation axis (C) and by rotating the auxiliary measuring tool in each one of the orientations around the stationary rotation axis (C).

3. Method according to claim 1, wherein the at least two rotation axes being different relative to the auxiliary measuring tool (4) are created by mounting the auxiliary measuring tool (4), if applicable together with the arrangement of auxiliary reflectors (5'),in at least two different first orientations and in at least two different second orientations, wherein the second orientations are selected in such a manner, that, every first orientation is convertible into at least one second orientation by rotation around a stationary, virtual rotation axis (C).

4. Method according to claim 2, wherein the stationary rotation axis (C) passes through a central zone of the reflector arrangement and of the light spot arrangement.

5. Method according to claim 1, wherein the angle between the two rotation axes being different relative to the auxiliary measuring object amounts to at least 25 to 30°.

6. Method according to claim 1, wherein for the step of registering measured data, the optical axis of the opto-electronic sensor (3) is placed approximately on the stationary or virtual rotation axis (C).

7. Method according to claim 6, wherein, for the step of calculating positions and orientations of the light spot arrangement relative to the opto-electronic sensor (3), an iterative reverse intersection method is utilised.

8. Method accordance to claim 1, wherein, for the step of calculating positions and orientations of the reflector arrangement relative to the laser tracker (2), a method of local axis alignment is utilised, wherein the relative positions of the reflectors (5) and if applicable of the auxiliary reflectors (5') are determined beforehand.

9. Device for calibrating a measuring system comprising a measuring device (1) with a laser tracker (2) and an opto-electronic sensor (3) having fixed positions relative to one another, an auxiliary measuring tool (4) and a system computer, wherein the auxiliary measuring tool (4) comprises at least one reflector (5) for reflecting a measuring beam (7) directed on to it by the laser tracker (2) and at least three light spots (6) capable of being registered by the opto-electronic sensor (3), the light spots being arranged in known positions relative to one another, the device (9) comprising:

installation means being equipped for mounting the auxiliary measuring tool (4) on the device (9) in at least two different orientations

and positioning means being equipped for positioning the device relative to the measuring device (1) such, that the auxiliary measuring tool (4) mounted on the device can be registered in each one of the orientations by the laser tracker (2) and by the opto-electronic sensor (3) of the measuring device (1).

10. Device according to claim 9 and further comprising a reflector element (10), the reflector element comprising at least one auxiliary reflector (5') and being equipped to be mounted in the different orientations by means of said installation means, together with the auxiliary measuring tool (4) and rigidly coupled with said tool.

11. Device according to claim 10, wherein the auxiliary measuring tool (4) is equipped for being mounted on the reflector element (10) and wherein the reflector element together with the auxiliary measuring tool (4) is equipped for being mounted in the at least two orientations.

12. Device according to claim 9 and further comprising a revolving table (11) and an orientation element (12) installed on the revolving table, wherein the installation means are arranged on the orientation element (12).

13. Device according to claim 12, wherein the orientation element (12) is wedge-shaped.

14. Device according to claim 12, wherein the installation means are arranged for the stationary rotation axis (C) of the revolving table (11) to pass through a central zone of the light spot arrangement of the auxiliary measuring tool (4) when mounted by the installation means.

15. Device according to claim 9, and further comprising installation means equipped for mounting the auxiliary measuring tool (4) in at least four orientations, wherein groups of at least two of the orientations are convertible into one another by rotation around a stationary, virtual rotation axis.

16. Measuring system comprising:

a measuring device (1) with a laser tracker (2) and an opto-electronic sensor (3) having fixed positions relative to one another,

an auxiliary measuring tool (4) comprising at least one reflector (5) for reflecting a measuring beam (7) directed on to it by the laser tracker (2) and at least three light spots (6) for being registered by the opto-electronic sensor (3), the light spots being arranged in a known light spot arrangement,

a system computer being equipped for carrying out the calculation steps of the method according to claim 1 and comprising a storage space for storing calibration data calculated according to said method, and being further equipped for carrying out calculation steps, in which the stored calibration data is utilised.

17. Measuring system according to claim 16, wherein the auxiliary measuring tool (4) comprises means for being mounted on a device according to claim 9.

18. Measuring system according to claim 16, wherein at least one of the reflectors (5) of the auxiliary measuring tool (4) is a cube corner prism, the corner zone of which is missing, and that behind the removed corner zone a light spot (6) to be registered by the opto-electronic sensor (3) is arranged.